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UTILIZING THE FALCIFORM LIGAMENT AS AN ADJUNCT GASTROPTOTIC SUPPORT.

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Surgical intervention in gastroptosis is only indicated in a small percentage of the cases that present themselves to the special or general man for treatment. It is the writer's observation that 85% of such cases answer to various mechanical methods, dietary and medicinal treatment. Of the remaining 15%, surgical treatment will be demanded ultimately in rectifying a gastric malposition. Three technics have heretofore been devised and used, two of which have the glaring fault of neutralizing one of the chief aids in normal digestion, namely, the physiological synchronous movement of the stomach and diaphragm in respiration. These two are: (1) The basket support given the stomach and transverse colon by suturing the great omentum to the peritoneal surface of the anterior abdominal wall in a wide crescent, devised by Coffey; (2) Rovsing's series of four sutures passing in a basting way equidistant across the longitudinal surface of the stomach, biting into the serous and muscular structures of the stomach only, from cardiac greater curvature end to the pylorus, thence out through the entire thickness of the abdominal wall; the sutures are tied over skin placed glass rods, the latter gauze covered, thus retaining the four suspending sutures until the freshened anterior stomach wall has ample time to become fixed to the peritoneal surface of the anterior abdominal wall.

Each of these methods obviate respiratory movement of the stomach, Rovsing's technic more so than Coffey's. Rovsing's method further leads, if the needle bite has not been gauged nicely, to gastric fistulas, and further has the surgical fault of utilizing a skin to stomach continuous suture, an extremely weak aseptic technic.

Fig. 1.—Case No. 1.—Position of stomach 10 days previous to operation. Mrs. M., aet. 38, school teacher. Operation Beyea-Crouse technic.

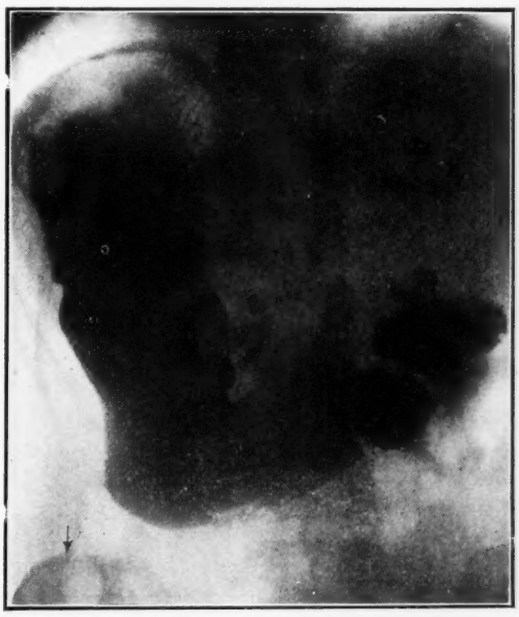

Fig. 2.—Case No. 1.—Illustration No. 2.—Mrs. M.—2 years subsequent to operation patient gained 30 lbs. All cases should be followed up with a fat-producing diet and the same tonic treatment as one uses with the non-operative case.

Coffey's omental basket support, coupled, as it frequently is, with plastic enlargement of the upper abdominal wall, together with overlapping of the lower muscular half, is an operation of too exhaustive a nature for the type of patient it is utilized upon; technically it is skilful, but practically it overlooks the weakened vitality of the subject it is planned to aid, a surgical fault of increased risk.

Beyea's operation is the only one of the three that has the physiological quality of digestive demands, namely, it permits the free movement of

the stomach during respiration, thus increasing the gastric blood supply through the up and down pumping strokes of expiration and inspiration.

Beyea plicates the gastro-hepatic omentum through a series of tucking sutures running from lesser stomach curvature to the closest point possible to the lower surface of the left lobe of the liver. Beyea's method acts ideally, provided that thinning out of the omentum, an endothelial structure, has not occurred to the degree that there remains insufficient material to fold and serve as a supporting medium for the stomach.

I frequently have been dissatisfied with the available gastro-hepatic omentum in severe gastroptotic cases, the long-existing drag having excessively thinned the lesser omentum. Searching through the upper quadrant of the abdomen for an available material that would retain Beyea's physiological points of a movable stomach, i. e., an indirect diaphragm attached stomach, naught could be found except the round ligament with its wing of peritoneum, the latter the so-called falciform ligament. This peritoneal fold sweeps from the anterior abdominal wall in a varying degree of breadth and thickness, extending from the diaphragm up to the anterior superior surface of the left lobe of the liver down to the umbilicus, infolds the round ligament from the latter's intralobular attachments to its umbilical end. The two—peritoneal fold and ligament—have a distinct wing-like appearance. Selecting this structure, the following operative steps were devised:

The abdomen is opened slightly to the right of the median line, in fact, through the right rectus to avoid incising this peritoneal wing of the falciform ligament. The length of the incision extends from ensiform cartilage to the umbilicus, thus giving ample area for appendical removal, left lobe of the liver elevation, or separation of omental adhesion, the latter a frequent cause of gastroptosis. The round ligament, its rounded substance standing out from its falciform peritoneal wing, is sought at the umbilical end, is then incised with curved scissors, then tagged with an intestinal forcep. The peritoneal wing is strained upon to demonstrate to the fullest its abdominal wall attachment, to the left of its attachment a half to one inch or so the peritoneum of the anterior abdominal wall is carefully detached along with the falciform ligament fold up to the latter's most superior abdominal wall area, and down to its umbilical end. The denuded area of the anterior abdominal wall is carefully tagged with intestinal forceps for future whipping occlusion.

The falciform ligament is then, if its thickness permits, carefully split—the fold normally being in two layers—is next tagged, then covered with warm moist saline pads and laid upon the abdomen until the usual Beyea's technic has been carried out. Then the round ligament and falciform peritoneal wing, the latter if split, is placed raw sur-

Fig. 3.—Case No. 8.—Illustration No. 1.

Mr. J. M.—Aet. 56—Miner, treated by means of diet and mechanical support. 14 months, no improvement. Operated upon April, 1918, Beyea-Crouse method. Cause of Gastroptosis Omentum adherent to retro-peritoneum caput coli and hepatic colonic angle. Omentum rolled upon itself and shortened.

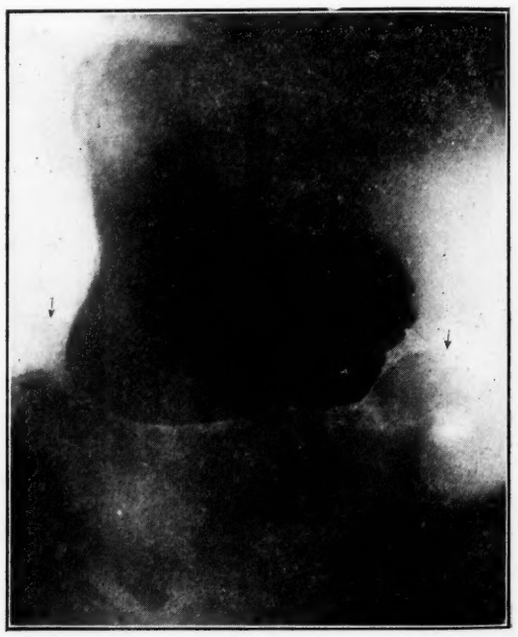

Fig 4.—Case No. 8.—Illustration No. 2.

Mr. J. B.—30 days subsequent to operation, the lift in the case being 4½ inches, with thorough tonic and dietary treatment, be markedly improved in the next year. All pictures taken patient standing.

face down so as to apply to the stomach and lesser omentum, being spread as far over as to include the lesser curvature area of the anterior stomach wall proper, as well as plicated gastro-hepatic omentum, to each of which it is tacked through the medium of 20 day chromic No. 1 gut. The basting sutures used in fixing the ligament and its perioneal fold to the plicated gastro-hepatic omentum reinforce a weakened endothelial structure with endothelium material, plus ligamentary substance.

Omental endothelium is but a diversified peritoneal structure. When the round ligament and peritoneal wing is added to the plicated gastro-hepatic omentum, from each of which exudates rapidly occur, a thickening and fortifying of the lesser

Fig. 5.

1.—Beyea's operation—first layers of sutures.

2.—Beyea's operation—first layer of sutures completed; the second and third being introduced (after Moynihan).

Beyea's pliquation of the gastro-hepatic omentum is followed by the writer's reinforcement, using the round and falciform ligament, shown in large view.

omentum results. A return to physiological normal situation of a misplaced organ is brought about, free respiratory movement is permitted and the suspension has not produced a fixed, faulty position.

Omental adhesions, according to my observation, have furnished the chief pathological cause of the 15% of gastroptotic conditions demanding surgical intervention. Such adhesions run the gamut of intrahernial occlusive efforts on the part of the omentum, omental sealings of suppurative appendical conditions, infected tubes, plastic attachments of omentum to the sigmoid, the latter the seat of previous ulcerations. In one instance the omentum was rolled, thus shortening itself through a firm attachment to the hepatic flexure of the colon and to the caput coli. The central area of the ascending colon had been skipped by the adhesions, thus resulting in a marked angulation of this portion of the large bowel, a post-typhoidal sequel no doubt. Two of my patients had a previous anterior abdominal wall trauma history, with resulting omental adhesions, by such the stomach was dragged down and fixed.

The accompanying *x*-ray prints of cases previous to and subsequent to the operative intervention speak for themselves. The writer's technic is briefly outlined with explanatory sketches.

This operative suggestion has the support of eight patients whom it has benefited.

THE GROUND GLASS OBSESSION

Rumors continue to appear to the effect that ground glass has been found in food and that an investigation is to be made by the federal government. During the last two or three years we have passed through a whole series of such nation-wide "scares." Our readers may remember the vogue of infected court-plaster, of the insertion of various organisms into bandages and dressings, of the finding of numerous alleged bombs in different localities. Today ground glass holds the stage. Just why any intelligent spy, or even an unintelligent German diplomat, should choose ground glass to kill off a community is problematical. Neither has anyone explained how enemy sympathizers are going to avoid the alleged manipulated foodstuffs. In works on forensic medicine and toxicology ground glass is mentioned as a mechanical poison. When the glass is coarsely ground it produces mechanical lesions of the lining of the gastro-intestinal canal which become infected. Ultimately the condition resembles a catarrhal and hemorrhagic inflammation. Both may result from perforation of the stomach or bowel, or from infection of the wounds and extension of the inflammation. A meal of very finely ground glass is regarded by some as harmless, and it has been reported that it is even used as a remedy among the peasants of eastern Europe. The concealing of ground glass in flour or in sugar, the two substances most commonly mentioned in the newspapers—any amateur psychologist can figure out why—would necessitate that it be ground very fine. These stories may have a certain value in keeping the public alive to the dangers of the spy peril. On the other hand, they stimulate cranks and other unbalanced persons to "go and do likewise," thus lending a substantial basis to the original imaginative stories.—*Journal of the American Medical Association.*

CRUSHING VERTEBRAL FRACTURE—REPORT OF A CASE, INCLUDING A BRIEF REVIEW OF RECENT LITERATURE.

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Fracture of the vertebral column, with consequent injury of the spinal cord, represents one of the most unfortunate and distressing accidents which can possibly happen to a living human being. Fortunately, however, such injuries are quite rare when compared with the other fractures.

Vertebral fracture almost invariably owes its origin to traumatic violence externally applied. While crushing injuries and falls are the most common etiologic factors, any form of external violence which produces forcible spinal flexion may cause fracture and crushing of one or more of the vertebræ with more or less extensive spinal cord damage.

Fractures of the cervical and dorsal regions are said to occur more frequently than those involving the lumbar and sacral portions of the vertebral column. Spinal fractures are more commonly noted in males than in females, probably because of occupational differences. The case to be herein reported in detail occurred in a young girl and was due to falling from a considerable height, therefore occupation was not a factor.

According to Hartwell, of one hundred and thirty-three cases of vertebral fracture treated at the Massachusetts General Hospital, eighty-three resulted from falling from heights; twenty-five from being "jack-knifed" by falling weights, etc., the causes in the remainder being miscellaneous.

There were forty-eight cases of deformity in the cervical region; one in the cervico-dorsal region; fifty in the dorsal region; one fracture in the dorsal and lumbar regions; and thirty-three in the lumbar region. Of seventy-six fractures in the cervical region suffered by forty-nine patients, sixty-two involved the fourth, fifth and sixth vertebræ alone or in combination. His tables confirm the generally accepted view that there are two regions of the spine especially liable to fracture, viz., the mid-cervical, and the dorso-lumbar. Isolated fractures of the vertebral processes seem rare; only seven are recorded,—five of the transverse and one each of the spinous and articular processes. In this series of cases process fracture resulted from direct trauma, body fractures being dependent upon indirect trauma.

"Whenever the injury is of such a nature as to produce a fracture in the vertebræ, it is always accompanied with considerable laceration of the muscles and ligaments, and often with hemorrhage, which may be extradural or subdural. At times there is crushing of the bodies of the vertebræ, with greater or less displacement."

The symptoms of vertebral fracture are usually so indicative that there would seem little excuse for diagostic error based upon the clinical signs alone; but at least two radiographic plates should always be made to confirm the clinical findings. Angular deformity is noted where displacement has occurred; gentle manipulation usually elicits crepitation; where the spinal cord is extensively damaged paralysis distal to the fracture site is a characteristic manifestation. However, in slight cord injury paralysis may be incomplete and thus cause confusion in the clinical diagnosis.

One of the most constant clinical signs is profound shock which may persist for hours or days in the event expectant treatment is employed. On account of absence of the spinal cord in the lower lumbar, sacral and coccygeal segments, fracture involving these situations is unlikely to be accompanied by paralysis, but other indicative physical signs are invariably present.

In severe cord injury complete motor and sensory paralysis immediately supervenes; both superficial and deep reflexes are inhibited; rectal and vesical sphincteric control is lost; in many instances lumbar puncture discloses blood-tinged spinal fluid.

Pain and tenderness at the fracture site are important diagnostic symptoms which must be remembered in studying the clinical manifestations of vertebral fracture regardless of the anatomic situation involved. The extent of the swelling, contusion, ecchymosis, etc., will depend largely upon the character of the causative trauma.

In Hartwell's series of cases, severe signs of cord injury were present in 62.6 per cent.; 43 per cent. had total transverse lesions of the cord; incomplete destruction in 19 per cent. In some of his cases no neurological symptoms were present. A significant fact is that of sixty-seven patients who had signs of cord lesions, in sixty-six the onset of paralysis was immediate,—in the only one was it gradual. Priapism was noted in twenty-seven cases in patients who presented signs of complete cord destruction; therefore, says Hartwell, this is a bad prognostic sign. Strange as the observation may appear, pain at the fracture site was infrequent, being mentioned in twelve cases only. Local discoloration, swelling, or contusion, was noted in twenty-three instances; localized tenderness in sixty-seven; deformity in fifty-one; and crepitation in eight. Post-mortem records showed three cases of fracture of the intervertebral discs, all in the cervical region.

In each there was complete motor and sensory paralysis below the segment of cord opposite the fractured disc with abolition of all reflexes, superficial and deep, and retention of urine and feces. Contrary to the prevailing belief, Hartwell's statistics show that shock is uncommon in vertebral fracture regardless of the accompanying cord lesion, and he believes its presence is indicative of complicating injuries. Shock was noted in only twenty-four of the one hundred and thirty-three cases reported.

Elsberg claims certain patients present few immediate symptoms of vertebral fracture, because of slight dislocation of the fragments; but months or years later evidences of interference with the function of the spinal cord make their appearance. "The symptoms are often due to narrowing of the spinal canal by a new growth of bone, or callus has caused a more or less marked angulation of the cord with pressure upon nerve roots. These patients can be entirely relieved of their symptoms by a wide laminectomy, which relieves pressure upon the cord and nerve roots and 'straightens out' the angulation by allowing the dural sac to bulge backward." (Elsberg).

Young records four cases of compression fracture of the fifth lumbar vertebra, in two of which the transverse process was also involved. He claims shock is out of all proportion to the injury; sometimes the patient is even unconscious. Pain is a constant symptom and is increased "on sitting down and getting up." Local tenderness, muscular spasm, and limitation of motion are present; but there are no cord symptoms, such as paraplegia or sphincteric disturbance. Should there be also displacement of the sacroiliac synchondrosis, Kernig's sign may be elicited. A lumbar scoliosis may be present. Disalignment of the spinous processes is a prominent sign. Lesions to be differentiated are: (a) fracture of the transverse process, in which there is never scoliosis, (b) displacement of the ilium, which is not accompanied by disalignment of the vertebræ, (c) lateral deviation in Pott's disease, in which kyphosis is the differentiating sign, (d) rachitis of the pelvis, which would be associated with other signs of rachitis, (e) malignant disease, (f) arthritis deformans, in which diagnosis can be made by roentgen picture.

According to Ely, in various lesions of the lumbar spine, inflammatory and traumatic, if the patient be placed upon his face, when his knee is flexed his pelvis on that side will rise from the table. The exact reason for this phenomenon is somewhat difficult to understand, but it helps to differentiate lumbar from sacroiliac lesions, having possibly in the former the same value as Kernig's sign in the latter.

The treatment of vertebral fracture represents one of the darkest chapters in the history of surgical achievement, the mortality being greater than that attending the management of any other type of osseous injury. This is readily explained by the fact that in the majority of instances more or less damage is inflicted upon the spinal cord tissues. It is obvious that where the cord is entirely severed no benefit is to be expected from any method of treatment, and continuation of the paralysis and dissolution of the individual is only a question of time. However, in incomplete lacerations the prognosis from radical surgical intervention is less unfavorable. "The prognosis of fracture of the spine, especially when it occurs in the upper spinal region, is very unfavorable; if the patient should recover from the shock attending such injuries, he is very likely to be paralyzed the rest of his days."

Elsberg remarks that many of these patients live a number of weeks remaining paralyzed, the final outcome being ushered in by high and irregular fever. Others remain alive for months or years, and succumb to bed sores and kidney infections. In a few improvement follows, the reflexes return, motor and sensory powers are re-established to a considerable extent, and after months or years the patients are able to get about with the aid of crutches or canes. The improvement which occurs is an evidence that there could not have been a complete transverse crushing of the cord. Such a course is rare, however, and the symptoms of a complete transverse lesion of the cord will generally persist to the end uninfluenced by operative treatment. Therefore it is useless to subject these patients to operation, and the surgeon must not be misled by the return of some of the tendon reflexes. The author has, in several instances, observed a very slight knee-jerk return for a few days, many weeks after a complete transverse crush of the cervical cord. "One of the reasons why laminectomy for fracture of the spine has fallen in disrepute is that so many patients with a hopeless lesion have been operated upon." The situation is quite different with patients in whom paralysis is incomplete, in whom there is incomplete loss of sensation upward to the level of the injury, in whom some of the reflexes persist and are perhaps exaggerated. The majority of these should be operated upon as soon as possible after the injury, especially if the *x*-ray shows marked distortion of the spinal canal by fractured bone or dislocated vertebral bodies. It is a well known fact that slight trauma of the spine may be the starting point of

a hematomyelia, and it is very possible if not probable that injuries of mild character may be an important etiological factor in many cases of spinal disease. If one carefully inquires into the history of patients with spinal diseases, it is quite remarkable that one will very often learn of an injury to the back which proceded the spinal affection by many years. (Elsberg).

Sharpe urges early operation in injury of the spinal column with involvement of the cord, whether trivial or serious, and reports ten illustrative cases. Although actual damage by bony pressure may already have occurred, great additional nerve destruction may result from hemorrhage and edema. Laminectomy performed as soon as the immediate shock of the accident has subsided, with opening of the dura thus removing pressure upon the cord, will prevent further injury and give the best possible chance for recovery. He states that in partial lesions of the cord, destroyed, damaged and sound fibers are found side by side, and if compression is quickly removed, not only the sound fibers be preserved but functional and even anatomic repair will occur in many of the damaged but not destroyed fibers. Inasmuch as the cord fibers, if damaged and compressed, may degenerate within four days, the author disagrees wholly with those who would postpone operation until the "blood clot is absorbed." From the viewpoint of symptoms he divides the cases into: (a) those with partial abolition of function, and (b) those with immediate and complete abolition. The treatment of both classes is, however, the same. The object of the operation is sufficient removal of bone to afford ample room for the cord, and free opening of the dura for removal and drainage of blood. The dura may be re-closed or not as indicated by the condition of the cord. As regards suture of completely divided cord, although the function cannot be restored, great improvement following suture in the sensory and trophic disturbances thus avoiding terrible bed sores, warrants the procedure. The author states that of five cases of suture reported, four of the patients were living several years after the operation, while without suture no patient has lived one year. In cases where suture it attempted, if the ends cannot be approximated and the lesion is in the dorso-lumbar region, an effort should be made to unite the roots above and below the lesion. (Sharpe).

There has hitherto existed much disagreement concerning the merits and demerits of laminectomy in the treatment of vertebral fracture, and even at present surgical opinion is apparently hopelessly divided. However, it would seem reasonable to suggest that where complete transverse section of the cord has not occurred, benefit in a certain percentage of instances may be expected to accrue from the performance of laminectomy with repair of the cord damage if possible. Where the cord has been completely severed, the statement of Elsberg is undoubtedly correct, that the case is hopeless from the beginning and operation is useless. "In our operations for spinal disease or injury, we have used different methods of approach (curved and straight incisions, hemilaminectomy and complete laminectomy) and various instruments, and I have arrived at the conclusion that the complete removal of the spinous processes and laminæ is the simplest and most reliable method for the opening of the spinal canal. Complicated instruments are unnecessary. After the exposure of the spines and laminæ by a straight incision and the separation of the muscles, the spines are removed at their bases with large rongeur forceps, and the laminæ are 'bitten away' with smaller rongeurs of various sizes and patterns. For the exploration of the spinal canal, a defect of at least 1cm. in width should be made, so that all sides of the cord can be investigated with the minimum amount of handling of the delicate cord tissues." (Elsberg).

Leriche operates under ether anesthesia, after disinfection with tincture of iodine, with the head slightly lowered. The exploration is made by the classical methods, to which radiographic examination of the vertebræ is added when absolute precision is necessary. The incision is made just to one side of the median line and the muscles carefully dissected with rugine; but the dissection is subperiosteal in name only. Hemostasis is accomplished by presure with tampons placed in the musculospinal groove. The spinous processes are then removed with gouge forceps and the medullary canal opened, either with forceps or the aid of Doyen's bit. If a vein bleeds the hemorrhage may be controled with the aid of a small section of muscle. Then the dura mater, held with two Tuffier forceps, is incised with a bistoury. After radicotomy has been accomplished, Leriche sutures the dura mater with small curved needle and No. 00 catgut, placing the sutures as near together as possible. This being finished, there is a large dead space corresponding to the laminæ and spinous processes which have been removed; this he fills with a muscle-flap with the flesh inside, against the dura mater. The muscles are then sutured in several layers; no drainage is used. He reports a mortality of ten per cent.

Nash records two cases of vertebral fracture treated by laminectomy. The first patient was a

male of forty-four who had paraplegia from the lumbar region downward, the ninth and tenth dorsal spines projecting markedly. An incision was made over the last five dorsal and first lumbar vertebræ; the muscles and fascia were dissected away and the spinous processes removed with bone forceps level with the laminæ. The spinal canal was completely exposed between the eighth and eleventh dorsal vertebræ, and was found to contain only fibrous strands, the cord proper having entirely disappeared. The operation was performed eight months after receipt of the injury.

The second patient was a male of thirty-five who had complete flaccid paralysis of both legs, loss of reflexes, and a bed sore in the lumbar region. About a week after the injury an incision was made from the tenth dorsal to the third lumbar vertebra and the spinal canal exposed. The cord was found crushed at the level of the lower edge of the tenth dorsal vertebra. Six months later the patient showed marked improvement.

In Willien's case a man was "squeezed" in a mine accident, sustaining fracture of the twelfth dorsal and first lumbar vertebræ, also several ribs, and one leg. He complained of no pain; temperature 100° F., respirations 22 and labored. There was a slight depression at the twelfth dorsal and first lumbar vertebræ, with curvature of the process to the right. Reflexes practically all absent; sensation from waist downward negative; voluntary and involuntary motion absent; there was bladder stasis; catheterization and enemata necessary. The *x*-ray confirmed the diagnosis of vertebral fracture. The patient's condition made laminectomy inadvisable until eighteen days after the injury. Meanwhile the leg fracture was reduced without pain.

The usual operation was performed and the twelfth and first lumbar spinous processes removed. Laminæ of the twelfth and first vertebræ were also removed to release pressure on the cord. The dura had been punctured by bony spicules and fluid escaped; the bodies of the twelfth dorsal and first lumbar vertebræ were also punctured; all fractured particles were removed; the wound was closed and drainage instituted. The patient made an uneventful recovery.

Murphy speaks of a man of thirty-five who fell a distance of twelve feet, striking on his buttocks, followed by pain in his back and lower extremities. His physician noted a prominence of the last dorsal and first lumbar vertebræ, with considerable ecchymosis. There was no paralysis, but loss of sensation over buttocks, perineum, scrotum, and back of thighs as far as knee; no loss of sensation in front of thighs; no girdle pain, and no annular paralysis. Since accident, catheterization necessary thrice daily. For first four or five days patient had great difficulty in defecation; since then involuntary evacuations. Examination revealed prominence of eleventh and twelfth dorsal and first lumbar spines. No paralysis of thigh muscles, but calf muscles flabby. Tactile sensation absent over glutei and diminished on back of thighs. Superficial reflexes present; left knee-jerk exaggerated; right slow and scarcely perceptible.

Operation disclosed pronounced forward luxation of first lumbar vertebra; angulation was so sharp and cord depressed to such extent that it seemed strange complete paralysis did not result. The spinous processes and laminæ were removed from first lumbar vertebra, so cord was perfectly free behind zone of compression. The muscles were sutured with catgut across spinal column, and outside this the lumbar fascia, making an accurate apposition. The dura was not opened. Patient left hospital within five weeks, wearing leather jacket; two months later he had regained complete control of sphincters and muscle power except "he could not raise himself on his toes." Five months after operation he had entirely recovered.

In Hartwell's series of cases (one hundred and thirty-three), already mentioned, forty patients were subjected to operation. In thirty-eight laminectomy was performed, and in two an attempt was made to remove the deformity by manipulations. Secondary hemorrhages were infrequent and rarely sufficient to account for compression symptoms. The results of the expectant plan of treatment equalled those obtained by operative methods, and he says the results of laminectomy in this series do not justify an argument in favor of the operation, but rather serve as a warning against radical surgical treatment. Based upon his experience the author believes laminectomy is absolutely contraindicated:

(1) In patients in shock, or who have received demonstrable injuries in addition to the spinal fracture and the cord damage accompanying it:

(2) In patients with fracture of the cervical spine whose respiration is embarrassed by paralysis of the intercostal muscles:

(3) In patients whose paralysis accompanied or was noted immediately after the accident:

(4) Before the fourth day of convalescence, because in cases in which improvement occurs it cannot be expected to manifest itself before the fourth day:

(5) In all patients who are improving under con-

servative treatment, and laminectomy cannot be expected to better conditions if improvement once shown comes to a standstill:

(6) In patients whose vertebral fracture is unaccompanied by medullary symptoms:

(7) In all patients with uncomplicated vertebral fracture with accompanying cord injury until at least four days have passed—the minimum time for spontaneous improvement to manifest itself.

The author agrees that laminectomy is indicated in the rare cases of gradual onset of medullary symptoms, and in patients who originally free from cord symptoms begin to develop manifestations referable thereto.

Personal observation: Six weeks ago, in the mountain region of Kentucky, a girl of seventeen fell on the ice and slid down the mountain side probably one hundred and fifty yards.* She was rendered unconscious by the fall and when found a few hours later both her feet were frozen. She was taken home and a physician called, who found and properly dressed a scalp wound, but made no further physical examination.

A few days later another physician was called, mainly because it was noted the girl was unable to move her lower extremities and did not urinate normally, there being almost a constant "dribbling" of urine. Upon investigation this physician discovered that the girl had sustained fracture of the spinal column and also several ribs, and advised that she be taken where an *x*-ray examination could be made to determine the character and extent of the injury and what could be done looking toward relief. This explains the delay in the institution of treatment.

The patient was brought to Louisville March 15th, 1918, and a careful radiographic examination was made by Dr. D. Y. Keith, which demonstrated a crushing fracture of the eighth dorsal vertebra, but not interference with the alignment of the discs. There was also some evidence of damage to the seventh and ninth dorsal. The disc of the eighth dorsal vertebra was badly crushed and the spinous process bulged outward, giving the characteristic appearance of an old angulation from Pott's disease.

The girl's condition, both physically and mentally, was desperate. There was complete paralysis from the injured area downward, with loss of rectal and vesical sphincteric control. All the reflexes were practically abolished. Vesical infection had supervened and the urine which constantly "dribbled" away was very offensive and had the appearance of thick green-pea soup. Her mental condition was one of utter despondency and depression; she was terribly emaciated, anorexia having been marked since receipt of the injury. Her pulse was about 130, temperature 101° F. She had no bed sores, but there were a few denuded areas on both feet where the skin had sloughed because of the frost bites.

The only sensory reflex we were able to elicit was in the genito-crural nerve area; pin pressure along the lower loin and inside the thighs caused slight twitching of the skin about the pubes. Further downward on the leg no reflexes were shown. Occasionally I was able to locate on the sole of each foot a small area where deep pin pressure caused slight jerking of the leg, but there was absolutely no sensation in those areas. The physician who accompanied the patient said he had tried faithfully, but had never been able to elicit this phenomenon. On the way to Louisville the voluntary micturition occurred for the first time since the accident—this was probably due to shaking of the train rather than to an over-distended bladder.

After making a thorough physical examination and studying the radiographic plates, I informed the physician and the family that in my opinion the condition of the girl was so extreme that she would soon die, and that no benefit could be positively promised from any method of treatment, though there was a faint hope that laminectomy with relief of pressure upon the spinal cord might be of some benefit. The patient might die on the operating table; but a fatal termination was inevitable unless radical operation was performed. They agreed to take the risk, and a laminectomy was performed March 20th.

I might mention that during the four days' preparation for the operation, the bladder was irrigated twice daily with boric acid solution, and once daily a twenty-five per cent. argyrol solution was injected. Under this treatment the urine became almost entirely clear, showing decided improvement in the bladder infection; the patient appeared to feel better and occasionally indicated a desire for food.

In performing the laminectomy a straight incision was made directly over the spinous processes and the bone removed over a sufficient area to expose about six inches of the spinal cord. It was demonstrated that the cord was not lacerated excepting at one point immediately underneath the eighth dorsal spine, but there was evidently considerable pressure because of the angulation present. Whether

*This case was briefly reported before a meeting of the Society of Physicians and Surgeons, of Louisville, Kentucky, March 21st, 1918.

a fragment of the fractured bone was driven through the dura at the time of the accident, or whether it was torn during my manipulation, is now uncertain; but I am inclined to think a bony fragment penetrated the dura; at any rate, a small quantity of clear spinal fluid escaped. Excepting for considerable distension below the damaged area there was no other apparent injury to the dura. The dural opening was closed with fine catgut sutures, and strange to say, there was very little hemorrhage. This is the only laminectomy I have ever seen performed where hemorrhage was not profuse. The external wound was closed in layers without drainage and a plaster dressing applied. When the patient was returned to bed her pulse was 120, and she was in no worse condition than when placed upon the operating table.

She passed a very comfortable day after the operation, her pulse remaining about 120, temperature 100° F. Her temperature during the night rose to 101° F., and she vomited a great deal during the afternoon. This afternoon she is feeling much better and more inclined to conversation; she answered questions promptly, smiled occasionally, and requested food several times; she was able to ask for what she wanted to eat, and seemed greatly pleased when they gave her some ice cream. She shows much more mental activity than at any time since the accident. This evening the mother told me that the child's legs had been twitching and jerking considerably. The patient herself says she first felt a "wavy sensation" in the soles of her feet, and since then a more or less constant burning feeling has been noted in the feet and legs. Her feet are now responsive to the pin pressure test, the least touch of the pin causing muscular contraction of the leg.

Of course, it is too early yet to do any prognosticating, and I have refrained from making any promises for permanent improvement. The patient's pulse tonight is 120, temperature 100° F. The nurse telephoned me late this evening that the girl had vomited violently and ejected a large round worm. It has been my experience that the majority of the Kentucky mountain people have round worms, and since she has gotten rid of this one I believe she will have less nausea and vomiting.

What the final outcome will be no one can foretell, but I believe it was right to give the patient the benefit of the only chance for permanent recovery, i. e., by undertaking radical operation.

NOTE—Later report, April 13th, 1918 :

The patient mentioned in the foregoing report has continued to improve. Her pulse is now normal; occasionally slight elevation of temperature is noted. She is eating and sleeping well, and is able to lie on her back, which she could not do previously. Her mentality is much improved, she is quite cheerful; movement of the legs from pin pressure test has markedly increased; at one time she was observed to cross her legs, which is regarded as a favorable sign. Unless some unforeseen accident occurs the outlook for complete recovery seems good.

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URETHRAL CALCULI.*

BY CHARLES C. MAPES, M. D.,
LOUISVILLE, KY.

No discussion of urethral calculi would be complete without brief historical reference to urolithiasis in general. That concretions formed within the urogenital tract of living human beings, and were occasionally expelled spontaeously *per vias naturales,* was known to ancient medical writers. An excellent and precise description of renal and urocystic symptoms induced by calculi is accredited to Hippocrates; numerous presumed urolytic agents were recommended by Pliny; and Celsus is said to have suggested the first method for successful extraction of calculi from the bladder.

So far as can be ascertained nothing appears to have been definitely understood concerning the chemical composition of calculi until after 1700 A. D., although speculative deductions led Paracelsus centuries previously to conclude the basic formative element was "tartar." "The tartar is deposited from wine upon the sides and bottom of the cask." In his opinion "tartar" was the origin of most diseases, and that it differed in its qualities according to the nature of the liquid from which it was separated. He gave it the name of tartar "because it burns the patient like hell-fire (tartarus) in severe diseases.

*It will be noted that the term "urethral" in connection with uroliths is accorded the broadest interpretation, i. e., it is made to include all concretions resident within the urethral lumen or diverticula associated therewith, regardless of their original formative situs. It is recognized that from the standpoint of technical accuracy the word urethral should be applied only to calculi originating within the urethral lumen. The superscription limits the scope of this dissertation to urethral calculi, and the privilege of discussing the prostatic and bladder varieties is reserved for a future contribution.

It is deposited when the archeus acts with too much impetuosity and irregularity, and when it separates the nutritive principle with too much activity. Then the saline spirit unites with the earthy principle, which always exists in the liquids, but in the state of *materia prima;* and this union occasions the formation of tartar or calculus."

From that remote period until the present calculi have been the subject of constant scientific study and investigation. The component elements of the various types of calculi have been isolated by chemical analysis and microscopic examination, and lucid descriptions of their intricate formations are contained in current urologic text books. MacCallum states "concretions of crystalline material, mixed usually with some organic substance, and found at any point from the renal papillæ and renal pelvis to the urethra, constitute the group of urinary calculi." According to anatomic situation they have opportunity of assuming various forms; e. g., an irregular mass from the renal pelvis upon reaching the bladder is likely to become round by continuous application of new crystalline layers. Calculi vary in chemical composition and appearance, depending partly upon the situation in which they are formed, but chiefly upon the chemical character of the urine. Since the urine may frequently change in character during months or years while the calculus is developing, the terminal result may show laminæ quite different in color, consistence, and chemical composition (MacCallum).

Beyond the fact that calculi are necessarily urogenetic in origin, practically nothing is yet known of the primary etiologic factors concerned in their production, nor is it possible to demonstrate the exact *modus operandi* of their inception. The original formative situs is likewise uncertain, i. e., whether calculi discovered (at operation, necropsy, or otherwise) within the renal calyces or pelves, the ureters, the bladder, or the urethral lumen, developed primarily and remained in those anatomic situations, or whether they originated elsewhere within the urogenital tract and migration then occurred, remains an unsolved physio-pathologic problem. Obviously the migratory theory presupposes that calculi originating within the renal tubular lumina may later become pelvic, ureteral, cystic, or urethral; and if small may be then extruded through the meatus urinarius externus without the production of indicative symptoms. Doubtless this sequence of events quite frequently happens.

While it may be insusceptible of actual demonstration, the hypothesis appears reasonable that the majority of calculi originate within the lumina of the *tubuli renales,* and thence migrate or gravitate to the other anatomic situations mentioned. Of course, this theory is inapplicable to urinary concretions which form around foreign bodies intentionally or accidentally introduced into the urethral lumen or the urocystic cavity.

It is admitted by MacCallum and others that calculi may form in normal non-albuminous urine, and may assume considerable size without causing symptoms; but because of their angular form they usually wound the renal pelvic or bladder mucosa, with the production of hemorrhage and inflammation which in turn are likely to change the reaction of the urine and initiate the deposition of layers of material of a character different from the original concretion. "When the calculus causes obstruction and bacteria are introduced, this change in reaction and the deposit of phosphates are inevitable." Kaufman contends that all urethral calculi composed of uric acid, urates, oxalate of lime, and cystin, are of secondary urethral origin; on the other hand, Lieblein has seen a primary urethral calculus composed of uric acid.

Kleinschmidt (cited by MacCallum) classifies calculi as non-inflammatory and inflammatory, and states that in each group there are primary and secondary formations representing stages of development similar to successive strata noted in geological formations. Several urinary crystalline substances, however, may form concretions without appreciable admixture, the chemical composition of the calculi being identical from center to periphery, e. g., uric acid, calcium oxalate, xanthin, cystin, calcium phosphate, etc. Some of them may become quite large, as do the mixed calculi; others form nuclei upon which, with a change in the character of the urine, successive layers of others substances are deposited. Diverticular calculi may attain enormous proportions; one mentioned by Bourdillat weighed 1,450 grams. In the absence of inflammation secondary calculi may be formed upon uric acid nuclei with layers of uric acid, urates, oxalates, calcium phosphate, etc. Likewise a calcium oxalate nucleus may later become a secondary calculus by being enveloped in layers of uric acid or calcium phosphate. "When bacterial infection and an inflammatory process supervene, phosphates, especially the ammonio-magnesium phosphate, sometimes with calcium carbonate, etc., make their appearance as strata of white, rather crumbly crystals, on the surface of one of these nuclei, just as they form an incrustation over any foreign body in the bladder. Indeed, they may form the whole calculus by them-

selves, without any obvious non-inflammatory stone or foreign body as a nucleus." (MacCallum.)

Much nomenclatural confusion has hitherto existed in the descriptive classification of urethral calculi, and there is yet no consensus of scientific opinion. It has been the general custom to classify as "urethral" all calculi resident within the urethral lumen without reference to their original site of formation. Lieblein, Kaufman and others contend that the designation "urethral" calculi should be restricted to those which form primarily within the urethral lumen, or which become augmented by deposition of new material after reaching the urethra. From a strictly technical standpoint this observation is undoubtedly correct.

Suter proposed the following system of nomenclature: "All calculi occurring in the urethra are to be designated as urethral calculi, whether primary or not. The term indicates where the calculus is found, without reference to its origin. To indicate its origin we may employ modifying terms, indicating whether the stone arises within the urethra itself, or wholly, or in part, outside. The terms proposed are: (a) autochthonous, (b) heterochthonous, and (c) amphichthonous. Autochthonous urethral calculi are formed in the urethra; heterochthonous urethral calculi are formed wholly outside the urethra; amphichthonous urethral calculi have their origin outside the urethra, but increase in size, by the deposition of new layers, after reaching the urethra." (Fowler.)

Some authors claim calculi never develop primarily within the urethral lumen. Legeu believes in every instance the calculus is renal or urocystic in origin and only secondarily becomes urethral. Grafe, however, considers all calculi remaining within the urethral lumen for any length of time formed there primarily.

Stevens admits that obviously primary urethral calculi are less commonly observed than the secondary type, and that primary formations depend upon certain abnormal conditions, such as strictures, congenital or acquired dilatations, diverticula, and prostatic hypertrophy; trauma also offers a favorable focus for the formation of concretions; likewise the composition of the urine is an important etiologic factor; concentrated urine rich in urinary salts, especially with ammoniacal decomposition, provides a favorable medium for calculus formations. "Deposits of such pathologic urine, especially if located at a point in the urethral wall which is changed in its configuration, will sooner or later become the nucleus." (Stevens.)

In nearly one-third of the reported examples, multiple concretions were noted. Thus, in Grobe's case 183 were extracted; Karajew removed 85 from a sac behind the prostate, and during convalescence 415 more were spontaneously extruded; Silthorpe removed 80 calculi from a urethral pouch behind a stricture in the scrotal portion. Multiple urethral calculi are sometimes faciculated, the most common variety being lozenge-shaped, the flat surfaces of the individual discs articulating with one another.

Englisch reviews four hundred and five cases of calculi impacted in the urethral lumen or in diverticula. Five patients were less than one year old; twenty-three under two years; ninety-two under ten; thirty-five between ten and fifteen; twenty-two between sixteen and twenty; forty-one between twenty and thirty; thirty-nine between thirty and forty; age not mentioned in the remainder. The sites were as follows: membranous urethra, 42 per cent.; penile urethra, 58 per cent.; distributed thus: navicular fossa, 11.2 per cent.; pendulous portion, 14.5 per cent.; scrotal portion, 13.7 per cent; and bulbous portion, 18.6 per cent.

According to Fowler, the largest urethral calculus mentioned in the literature is one recorded by Fisher which weighed "nineteen and one-half ounces." It was limited to the anterior urethra. The calculus in Kurbatow's case weighed 390 grams, and in Rorig's 250 grams. Kapsammer removed a calculus weighing 162 grams from a sac between the prostate and rectum. Naguera mentions a urethral calculus weighing 130 grams and measuring 14 cm. by 8 cm., which was passed spontaneously through a fistula (Fowler).

(To be continued)

ONE HUNDRED PERCENT AMERICAN.

It is a pleasure to announce to our readers that the Bayer Company, manufacturers of the well known Bayer products, was taken over some time ago by the Alien Property Custodian and it is now a strictly American Corporation with American Officers and American Board of Directors.

The proceeds of the sale of the old Bayer Company will be held by the Alien Property Custodian until the end of the war when Congress will decide as to the disposition of the money, but in the meantime full confidence can be accorded the Bayer Company with a knowledge that it is an American Company from the President to the office boy.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

NEW YORK, OCTOBER, 1918.

VENTRICULOGRAPHY.

A novel method of diagnostic procedure has recently been introduced which bids fair to develop into big possibilities. The method is introduced by Walter E. Dandy of Johns Hopkins Hospital in an article entitled, "Ventriculography Following the Injection of Air Into the Cerebral Ventricles" (*Annals of Surgery,* July, 1918). As Dandy says, *x*-ray has proven of little value in the diagnosis of brain tumors; in Dr. Halsted's clinic only six per cent. of brain tumors cast a shadow, and in these the tumor was in part calcified. Practically *x*-ray diagnosis of brain tumors is restricted to cases where the skull is involved; and inasmuch as such involvement occurs nearly always in the later stages of the malady, when the condition is easily diagnosticable by other methods, *x*-ray diagnosis of brain tumors may be said to have hitherto been very nearly useless. Dandy conceived the idea of filling the ventricle with a substance that would cast a shadow in the radiogram. Since most neoplasms directly or indirectly modify the shape of the ventricles, Dandy believed that a change in size and shape of the ventricle would furnish an accurate aid in the localization of intracranial affections. Such a substance must obviously be non-toxic and readily absorbed. After numerous animal experiments, in which various substances were employed, always with fatal results, Dandy concluded that ventriculography could only be possible by substituting a gas for cerebrospinal fluid. The sharpness of gas bubbles in the ordinary plate led Dandy to try the injection of ordinary air. The merits of other gases are being considered. Dandy has devised a technic whereby as much cerebrospinal fluid as can be obtained is aspirated from the ventricle and replaced by an equal quantity of air.

A Record syringe with a two-way valve attachment is introduced either into the anterior or posterior horns; in young children this can be done by way of fontanelles; when these openings are closed it is necessary to make a small opening into the bone. Dandy submits the proper positions in which the head must be placed, in order that the maximum amount of fluid may be obtained in puncture of either anterior or posterior ventricles. In order that the brain shall not be injured by causing too great a negative pressure, the air is injected as the fluid is being withdrawn. Thus far, Dandy has injected air into the lateral ventricles twenty times; only once was there any reaction; this occurred 48 hours after the first stage of an operation for cerebellar tumor. All the injections were made in children between six months and twelve years of age. The radiogram may be taken either from the lateral or the antero-posterior position. The illustrations that accompany Dandy's paper are striking and show the ventricles outlined more clearly than we deemed possible. Thus far, Dandy has not yet obtained what he considered a normal ventriculogram, because the procedure was only attempted in abnormal cases. But one thing Dandy has already determined, and that is, that he has been able to diagnosticate a beginning internal hydrocephalus long before our present available methods of diagnosis enable us to do. The method has not yet been attempted upon adults, but Dandy anticipates several diagnostic possibilities. "1. The enlarged ventricles in internal hydrocephalus should be absolutely defined. 2. Tumors in either cerebral hemisphere may dislocate or compress the ventricle and in this way localize the neoplasm. 3. Tumors growing into the ventricles may show a corresponding defect in the ventricular shadow. 4. A unilateral hydrocephalus may be demonstrable if the air cannot be made to enter the opposite ventricle."

Any method that helps us in one of the least satisfactory fields of surgery is always welcome. Dandy's method sounds as reasonable as it is novel and further investigations are awaited with interest.—E. M.

BLOOD SUBSTITUTES FOR TRANSFUSION

It is common knowledge among military medical men that during active operations at the front, the Casualty Clearing Stations become crowded with wounded, the largest part of whom are actively suffering from the effects of hemorrhage. In a large percentage of those that die, the fatality is directly due to the acute anemia. The probabilities are very strong that almost all of the latter could be saved by the transfusion of blood.

Granted that all other conditions could be adequately and promptly met, it is manifest that the large amounts of human blood necessary for the hosts of wounded can not be available behind the lines, even if it were feasible to store human blood rendered incoagulable by the use of citrate solution. A great need has therefore arisen for artificial solutions which can take the place of blood.

It has been shown in animal experiments that it is important to maintain the blood bulk; and provided it remains within relatively normal limits, the amount of hemoglobin may be reduced to one-fourth of its normal amount without any resultant permanent ill effect. A further reduction of the hemoglobin results fatally. It seems from the experimental work reported that salt solution is the poorest substitute. The best results have been obtained with Bayliss' seven per cent. acacia solution; in less urgent cases a two or three per cent. solution answers the purpose. Hogan's solution—a 2.5 per cent. solution of gelatine has also given good results. The latter two, however, leave the circulation rapidly; and in order to obtain a permanent improvement it is necessary to employ solutions of a strength equal to that of Bayliss' solution.

The practical point to be gleaned from these facts is that each Casualty Clearing Station should be provided with sufficient amounts of these blood substitutes and with sufficient facilities for administering them to large numbers of men quickly. In a minimum number of the wounded, transfusions of small amounts of blood will be necessary in addition to the blood substitutes, but the amount of blood needed will be relatively small and should be easily obtainable behind the lines.—A. O. W.

PATRIOTISM WITHOUT HESITATION.

If our soldier boys deliberated as long over doing their duty as some of our people at home hesitate over doing theirs, the victory would be doubtful.

It is a sort of financial cowardice to hesitate to put your money in United States Government securities.

Surgical Sociology

Ira S. Wile, M.D., Department Editor.

SOME CAUSES OF INDUSTRIAL ACCIDENTS.

The investigation of industrial accidents continues to be a part of specific war work. The British Health of Munition Workers Committee has made a specific investigation of the causative factors of industrial accidents, and our own Bureau of Labor Statistics is soon to present some of its compilations, based upon recent studies. (Monthly Labor Review, August, 1918.)

Some of the findings of the British Committee are of particular interest; for instance, the number of accidents to women were 2½ times as numerous when they were working a 12-hour day as compared with a subsequent period during which they worked 10 hours per day. It is patent that fatigue probably plays a marked part in this incidence of all accidents, and indicates the practical importance of a shorter work-day for women in industry.

The evidence with reference to the effects of alcoholic consumption was largely indirect, but the conclusion is reached that the influence of alcoholic consumption is manifest more in the night shift than in the day. This probably represents the opportunity for drinking in the day time, the results of which are carried over into the night. Experience tends to show that under methods of discipline the accident rates and the per capita use of alcoholic drinks decline more rapidly for the night than for the day shift.

"Accidents due to foreign bodies in the eye were 7 to 27 per cent. more numerous in the night shift than in the day shift, though all other accidents were considerably less numerous. This was due to the artificial lighting, as the excess of eye accidents was most marked in the worst lit factory." When every effort is being made to speed up industrial processes, the night shift should have every opportunity of working under as nearly daylight conditions as possible. The difficulties of artificial lighting are well known, but nevertheless, methods are now available whereby inadequate lighting may be practically abolished, and, with it, the types of injuries occurring in poorly lighted workshops tend to disappear.

Facts appear to be sufficiently numerous to justify the conviction that accidents increase in direct ratio to the temperature; the higher the temperature, the larger the number of accidents, although slow increases are also noted at temperatures lower

than 65 to 69° F. The importance of temperature and humidity regulation is obvious.

The report suggests that accidents are largely due to carelessness and inattention. While this may be true in a sense, it is probable that ignorance and inexperience are more largely the cause of accidents. Without minimizing the importance of personal care, it is more likely that the emphasis should be placed upon the development of adequate skill in various processes, particularly in those industries where accidents are prone to occur. The protection of machinery, the installation of safety devices of all kinds are not entirely sufficient to offset the hazards arising from the frequent turnover of labor, or the use of inexperienced employees at processes requiring special training and education.

Accident prevention is in part due to numerous psychical influences, but undoubtedly no psychical influence is of greater significance than that arising from a hazy or indefinite understanding of the work to be performed, the processes required, and the methods of attaining the specific goal set out by the employer, to whom the output is of maximum significance.

In the interests of material economy, and the safety of employee, preliminary training should be required of every employee so that an apprenticeship will give some measure of protection from the gross hazards which are preventable. The demand for labor of all kinds is so great that the rapid substitution of women for men in itself forms a new item in the causation of industrial accidents. Thus far, the industrial world has met the problem with a show of great interest, but there has not been complete recognition of the inherent difficulties in the readjustments of women to the industrial sphere. The prevention of accidents must begin with the installation of all safety appliances and devices on the one hand, and the instruction of the employee on the other hand.

The main factors influencing accident occurrence are those due to:

"Factors of personal origin—

I. Nervous and muscular co-ordination in relation to speed of production.
II. Fatigue.
III. Physical influences.
IV. Nutrition and alcohol consumption.

Factors of external origin—

V. Lighting.
VI. Temperature, humidity, and ventilation.
VII. Defects of machinery and absence of guards."

The interpretation of these various factors involves a thorough understanding of the physical health of employees, their mental capabilities, their moral standards, their adaptability to new modes of employment, and the specific influences determining their entrance into the industrial field.

Education for occupation is a vital item in the prevention of industrial accidents, because where skill is lacking, carelessness, inattention, nervousness, and fatigue are likely to be found, leading possibly to undernutrition, or malnutrition, recourse to alcohol, and sundry other habits tending to undermine the industrial capacity. In other words, to the ordinary factors usually tabulated as causes of industrial accidents, one must add at this day one more of transcendent importance, namely, a lack of skilled training, or experience.

Book Reviews

Progressive Medicine. A Quarterly Digest of Advances, Discoveries and Improvements in the Medical and Surgical Sciences. Edited by HOBART AMORY HARE, M.D., Professor of Therapeutics, Materia Medica, and Diagnosis in the Jefferson Medical College, Philadelphia, etc. Assisted by LEIGHTON F. APPLEMAN, M.D., Instructor in Therapeutics, Jefferson Medical College, Philadelphia, etc. *Volume I.* March, 1918. LEA & FEBIGER, Philadelphia and New York, 1918.

The résumé of medical and surgical progress and technic in this quarterly number of Progressive Medicine includes a most excellent section devoted to Surgery of the Head, Neck and Breast by Charles H. Fraser, a considerable portion of which discusses gun-shot wounds of the head.

Similarly, Mullar contributes a section on War Surgery of the Chest that is eminently satisfactory. The chapters on the Infectious Diseases are of particular interest, particularly because of the importance of these afflictions in connection with military efficiency. Brief paragraphs on Trench-fever, Trench-foot, and Trench-shin make the connection between disease and war more directly.

Other chapters are devoted to Diseases of Children, Floyd M. Crandall; Rhinology, Laryngology, and Otology by George M. Coats, which maintain the usual high standard characterizing Progressive Medicine. Military Otolaryngology receives considerable space in a very timely discussion.

Amputation Stumps: Their Care and After Treatment. G. MARTIN HUGGINS, F.R.C.S., Medical Officer to the Government Schools, Rhodesia; late Surgical Specialist to the Pavilion Military Hospital, Brighton. London: HENRY FROWDE and HODDER & STOUGHTON, 1918.

Huggins' monograph is very timely and very valuable. He describes the various kinds of stumps which have resulted in the present war and pays special attention to the guillotine stump. The methods of secondary amputation in various parts of the upper and lower extremity are described in detail and with the object in view of rendering a good functional stump. The causes for failure, the causes for sinuses, sequestra and other delaying conditions are detailed and Huggins gives carefully detailed directions for avoiding these disappointments. On the whole, the monograph should find a place with every surgeon.

1917 **Collected Papers of the Mayo Clinic,** Rochester, Minn. Edited by MRS. M. H. MELLISH. Octavo of 866 pages, 331 illustrations. Philadelphia and London: W. B. SAUNDERS COMPANY, 1918. Cloth, $6.50 net.

This is the ninth annual volume of reprints of all of the scientific communications made by the various members of the staff of the Mayo Clinic. The volume includes all of the papers published in 1917. Many of the individual papers have been previously reviewed in numbers of the AMERICAN JOURNAL OF SURGERY. All of them are of interest to every medical man.

Diseases of the Male Urethra. By IRVIN S. KOLL, M.D., Professor of Genito-Urinary Diseases, Post-Graduate Medical School and Hospital, Chicago. Octavo of 151 pages, with 123 illustrations, several in colors. Philadelphia and London: W. B. SAUNDERS COMPANY, 1918. Cloth, $3.00 net.

Koll's book is a comprehensive monograph covering the diseases of the male urethra. The conditions included are gonorrhea and all of its complications; non-gonorrheal urethritis; urethrorrhea, prostatorrhea, and spermatorrhea; tumors of the urethra; verumontanitis and urticulitis; sexual impotence and sterility.

The subject matter is covered fully and is well and profusely illustrated. The operations for stricture—which owing to the new methods of treatment of gonorrhea are becoming less and less frequent—are described. Koll believes that for epididymo-orchitis or epididymitis most relief is afforded by combining the Belfield operation (vasotomy) with the Hagner operation (epididymotomy).

The volume should be of interest to all genito-urinary men.

The Treatment of War Wounds. By W. W. KEEN, M.D., LL.D., Emeritus Professor of Surgery, Jefferson Medical College, Philadelphia. Second edition, reset. 12mo, 276 pages, illustrated. Philadelphia and London: W. B. SAUNDERS COMPANY, 1918. Cloth, $2.00 net.

This little volume was originally a report rendered to the Medical Committee of the National Research Council and advantage has been well taken of the need of a second edition to amplify its contents and bring the whole as near as possible to date.

The respects in which this war differs from all others—the huge numbers of men, the new weapons, and other means of warfare developed in this war—furnish the opening chapters. There follows complete descriptions of the new methods of treating war wounds: especial attention is paid to the Carrel-Dakin method and to the field for orthopedic surgery. Chapters are also devoted to tetanus, gas infections, and wounds of the various parts of the body.

A number of letters are appended from various leading surgeons abroad which emphasize the importance of certain principles described in the text. A chapter is contributed by Major McKenzie on the rehabilitation of crippled soldiers.

Sanitation for Medical Officers. EDWARD B. VEDDER, M.D. Lieut. Col., Medical Corps, U. S. A. Illustrated. LEA & FEBIGER, 1917.

This small work was planned to supply medical officers a useful guide for sanitary work. Sanitary orders and circulars are included to make the information official as far as possible. The section on transmissible diseases has been made to include the most recent knowledge concerning the etiology of each disease.

The section on camp, the march, the trenches and battlefield are full of valuable information; 25 pages are written on "insects concerned in the transmission of disease," and these contain many details on the detection and preventtion of the diseases discussed.

There are dispersed through the book blank pages for notes and memorandums.

Cancer. Its Nature, Causes, Diagnosis and Treatment. By ROBERT HOLMES GREENE, A.M., M.D., F.A.C.S., Emeritus Professor of Surgery, Medical Department of Fordham University, Etc. JAMES T. DOUGHERTY, New York, 1918.

This little volume describes in a very simple and efficient manner the natural history of cancer as it manifests itself in human pathology. The topics covered are indicated in the title: "No attempt has been made to settle definitely many of the questions arising in connection with this wide-spreading disease, but an effort has been made to show the lines along which future investigators probably must work."

Gas Gangrene. Its Bacteriology, Experimental Reproduction and Serotherapy. By M. WEINBERG, Chief of the Laboratory, and P. SEGUIN, of the Pasteur Institute. Large octavo of 444 pages with 45 illustrations, and 16 plates. Paris: MASSON & CIE, 1918.

The perusal of this volume, a contribution from the Pasteur Institute, emphasizes anew the extraordinary efficiency with which the military medical men are overcoming the extraordinary problems presented by the great war. Gas gangrene was one of the most cruel surprises of the war for the surgeons, badly prepared for combating this scourge. The problem was set and competent men were found; the result is that gas gangrene has been put upon a sound pathological and bacteriological basis.

The monograph is a complete exposition. An exhaustive study of the bacteriology is described in all its minutiae and demonstrates the origin of the disease in fecal contamination from the human body or from the heavily manured fields of northeastern France. It is shown that the infection is most always due to a number of organisms, alike in some and differing in other respects, all marked with a seeming unity of purpose in that each is a potent helper to all of the others; and the symbiosis results in a maximum of effort for destructive purposes.

Weinberg and Seguin describe the clinical forms and the internal and external factors which favor the development of this infection. Quite a large chapter is devoted to the various sera which have been developed for use against the toxic manifestations of the disease. One is perhaps disappointed somewhat that no mention is made of the work of Bull and Pritchard of the Rockefeller Institute, and of the efficacy of their anti-toxic serum. Weinberg and Seguin have had good and bad results after the use of their sera. This phase of the subject is still somewhat experimental.

The monograph is very excellent and is a distinct contribution to medical science.

War Surgery of the Abdomen. By CUTHBERT WALLACE, C.M.G., F.R.C.S., Eng., M.B., B.S., Lond. Surgeon to St. Thomas' Hospital; Lecturer on Surgery in the Medical School; Consulting Surgeon British Armies in France. Octavo of 152 pages with 26 illustrations. Philadelphia: P. BLAKISTON'S SON & Co. 1918.

One of the difficult parts of war surgery is that pertaining to the abdomen. The diagnosis is seldom easy; the conditions under which the surgeon works are never of the best; the lesions are difficult to treat; the complications are varied and many. And yet results in the present war have, comparatively speaking, been better than in previous wars. All of this is directly due to the fixity of the fighting line which lends itself to the formation of facilities, customarily seen in civil life, and of which the most important is the speed with which the wounded are brought to the operating table.

On the whole Wallace has given us a fine contribution basing it on the experience of many surgeons and many operating centers and hospitals at one of the battle sectors. There is a fine chapter on the general considerations and this is followed by chapters devoted to the individual organs. The general scheme followed is to discuss the individual lesion, the other injuries with which it is commonly associated, and the approved methods of treatment.

The value of the book is further enhanced by numerous tables and diagrams.

Progress in Surgery

A Résumé of Recent Literature.

Why Are the Tonsils and Lymphatics of the Nose and Throat Responsible for So Many Systemic Diseases? R. H. GOOD, M.D., Chicago, *Illinois Medical Journal*, May, 1918.

Good epitomizes a few of the more recently demonstrated facts regarding the tonsils, their lymphatic distribution and their place in the introduction of infection into the body. He cites the experiments of Grober in tracing out the passage of infection from the tonsils into the lymphatic system.

The tonsils are fully developed at birth and ready to perform their function—whatever that is. The crypts become filled with mucus, epithelial and food debris and bacteria. Jonathan Wright found that carmine granules blown against the tonsils were absorbed into the lymphatics while bacteria remained in the crypts. Good believes that this is a location of choice of the bacteria due to the rich food supply in the crypts. Their toxins are absorbed and slowly immunize the individual against infection. Good believes this to be the function of the tonsil.

Some Observations on the Decompression Operation on the Hypophysis by the Nasal Route. OTTO J. STEIN, M.D., Chicago, *The Laryngoscope*, May, 1918.

In discussing decompression of the Sella Turcica for tumor of the pituitary body Stein enumerates the various methods of approach and submits as the route of choice the transphenoidal approach through the nose—the method employed by Oskar Hirsch of Vienna—submucus removal of the entire septum to and into the sphenoid. As an anesthetic he uses morphine-hyoscine or scopolamine-morphine. He calls attention to the dangers of acidosis and cites a case that he lost in this way.

The diagnosis in these cases established by three cardinal symptoms, headache, loss or defects in vision and perverted pituitary physiological function. The diagnosis is confirmed by the *x*-ray finding. A good picture is of extreme importance to the surgeon, outlining as it does the variations in the position of the important neighboring structures and the thickness of the bony walls.

Another advantage of the submucus route is that the surgeon is at all times in the median line of the body and furthest away from optic nerve, carotid artery and cavernous sinus. Further, the author says asepsis is best maintained through this route.

Fractures of the Elbow. JACOB GROSSMAN, New York City. *Interstate Medical Journal*, June, 1918.

1. Fracture of the elbow occurs commonly in children.
2. Males are more frequently affected than females.
3. Acute flexion is the best position for all fractures of the elbow except fractures of the oleocranon process. These latter should be retained at almost complete extension.
4. Passive motion, massage and exercises should be given early. The tenth to the twelfth days are very good times to begin. Continue this treatment until the movements of the elbow are normal and free from pain.
5. Displacement of the fragments must be guarded against when passive movements are begun as faulty reduction causes periosteal proliferation that may lock the joint.
6. Fracture of the head and neck of the radius, while not a common condition, occurs often enough to be considered while making a diagnosis of injuries to the elbow.

The Treatment of Leg Ulcers. P. G. SKILLERN, JR., Philadelphia, *New York Medical Journal*, June 15, 1918.

Sterilize the ulcer with 20% solution dichloramine-T dissolved in chlorcosane and leave the ulcer open, exposed to the air, keeping the bed clothesaway with a cradle. Over the ulcer itself apply a wide meshed paraffin mosquito netting. The dichloramine-T is sprayed in a 5% solution every 24 or 48 hours. As soon as the ulcer is sterile, as determined by the bacterial count, skin grafting is done. If the sterilized ulcer is small, it is best treated with calomel adhesive plaster. Most leg ulcers yield to these methods. If persistent, Skillern recommends the Nussbaum incision. This consists in making a circular incision two cms. from the margin of the ulcer. The circular incision is closed with fine horsehair sutures. In certain cases, dry hot air at temperatures of 250° to 300° is applied three times a week. When the ulcer is healed, the varicose veins are treated either by bandage or stocking, or by operation.

Sensitized Vaccines in the Prophylaxis and Treatment of Infections. R. L. CECIL, New York, *American Journal of Medical Sciences*, June, 1918.

It has been shown by numerous investigators that a vaccine sensitized with an homologous serum produces less local and constitutional disturbance when injected subcutaneously than does a non-sensitized vaccine. Even living virulent organisms when properly sensitized can be injected subcutaneously without serious consequences.

It has been maintained by some that sensitized bacteria, either living or dead, produce a more rapid and efficient immunity than non-sensitized bacteria do. This question, however, cannot be considered settled as yet.

Sensitized vaccines have been extensively used for prophylactic and therapeutic purposes.

The author has employed sensitized vaccines in a series of 47 cases, which include 20 cases of prophylactic vaccination against typhoid fever, and 27 cases of therapeutic vaccination against gonococcus, streptococcus, staphylococcus aureus and tuberculous infections. The sensitized typhoid vaccine produces a somewhat milder reaction than ordinary typhoid vaccine, and probably gives just as high an immunity. At the present time, however, the evidence for its superiority is not sufficient to justify the substitution of sensitized for ordinary vaccine in practice.

In the various infections treated with sensitized vaccines the results were, as a rule, no better than would have been expected with ordinary vaccine. It happened that in a few instances recovery followed the administration of sensitized vaccine after treatment with ordinary vaccine had failed. This may have been due to the fact that larger doses could be employed without untoward symptoms.

The chief objection to the general use of sensitized vaccines is the increased labor and time necessary for their preparation.

At the present time it would seem desirable to limit their use to the treatment of infections in which there is hypersensitiveness to ordinary vaccines or in which the latter have proved inefficacious.

Female Sterility. T. C. STELWAGEN, M.D., and P. S. PELOUZE, M.D., Philadelphia. *Journal of the American Medical Association*, April 6, 1918.

While valuable work has been done on the bacterial flora of the female genitalia, little appears to have been done as regards the possible effects of such flora on procreation. The authors report a case of a woman who had been under the care of an eminent gynecologist for a year and a half, for the purpose of correcting an apparent sterility without effect, though her husband's seminal fluid contained countless numbers of very active spermatozoa. There was complete absence of vaginal discharge. The cultures taken from the vagina showed the usual flora with the predominance of diphtheroids, while those from the cervical canal were purely diphtheroids, showing almost all of the Westbrook types of diphtheria bacillus, with many striking metachromatic forms. Autogenous vaccines were made and used on the husband and wife. This caused the disappearance of the diphtheroids. Three months later she found herself pregnant, and later give birth to a healthy girl baby. Since this experience, they have had occasion to examine bacteriologically two cases of female sterility. In one of them diphtheroids were found in the cervical canal and in the other a study made for Dr. Alexander Randall, they predominated. Both patients are now under treatment with autogenous vaccines, but it is too early to report results. The authors hope that others will study similar cases.